

## Chapter 7 Similarity

### 7.1 Ratio and Proportion

Ratio—a comparison of two numbers

$$\frac{a}{b} \quad a:b$$

Simplify the following ratios:

Example  
1860 students  
310 athletes

$$\begin{array}{r} 1860 \\ - 310 \\ \hline 1550 \end{array}$$

non athletes

Athlete: student ratio

$$\frac{310}{1860} \quad 1:6$$

Athlete: non-athlete ratio

$$310:1550 = \frac{1}{5}$$

Must convert to the same unit!

K H D Base D C M

$$250 = m$$



40cm

Length:width

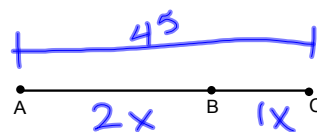
$$\frac{200}{40} = \frac{5}{1}$$

Simplify  $12 \text{ in} = 1 \text{ ft}$   
 $2 \text{ ft} : 20 \text{ in}$   
 $12 \text{ ft} : 5 \text{ yd}$  (3ft = 1yd)  $\rightarrow 15 \text{ ft}$

$$24 : 20$$

$$\frac{24}{20} = \left(\frac{6}{5}\right)$$

$$\frac{12}{15} = \left(\frac{4}{5}\right)$$



$$AC = 45$$

The ratio of AB:BC is 2:1.  
 Find AB and BC.

$$2(15) = 30$$

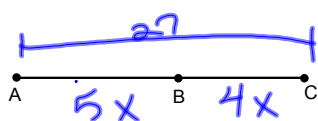
$$AB = 30$$

$$2x + x = 45$$

$$3x = 45$$

$$x = 15$$

$$BC = 15$$



$$AC = 27$$

AB:BC is 5:4

$$5x + 4x = 27$$

$$9x = 27$$

$$x = 3$$

Find AB and BC.

$$AB = 5(3) = 15$$

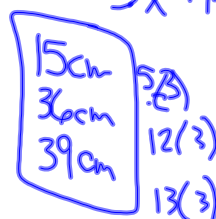
$$BC = 4(3) = 12$$

The ratio of the sides of a triangle are 5:12:13.  
 The perimeter is 90 cm. What are the lengths of the sides?

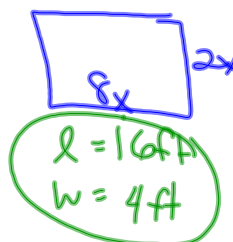
$$5x + 12x + 13x = 90$$

$$30x = 90$$

$$x = 3$$




The perimeter of a rectangle is 40ft.  
The ratio of length to width is 8:2.  
Find the length and the width.

$$\begin{aligned}
 P &= 2l + 2w \\
 P &= 2(8x) + 2(2x) \\
 40 &= 16x + 4x \\
 \frac{40}{20} &= \frac{20x}{20} \\
 2 &= x
 \end{aligned}$$


$l = 16\text{ft}$   
 $w = 4\text{ft}$

~~De~~  
The perimeter of a rectangle is 32m.  
The ratio of length to width is 5:3.  
Find the length and the width.



$$\begin{aligned}
 l &= 10\text{m} \\
 w &= 6\text{m} \\
 32 &= 2(5x) + 2(3x) \\
 32 &= 16x \\
 2 &= x
 \end{aligned}$$

Proportion—equation stating 2 ratios =

$$\frac{a}{b} = \frac{c}{d}$$

$$ad = bc$$

“a is to b as c is to d”

Cross Product Property

Product of Means = Product of the extremes

$$ad = bc$$

Solve the following proportions:

$$\frac{5}{3} \times \frac{20}{x}$$

$$5x = 20 \cdot 3$$

$$5x = 60$$

$$x = 12$$

$$\frac{6}{18.2} = \frac{9}{y}$$

$$6y = (18.2)9$$

$$6y = 163.8$$

$$y = 27.3$$

$$\frac{4x-5}{3} = \frac{21}{9}$$

$$321 = 9(4x-5)$$

$$63 = 36x - 45$$

$$108 = 36x$$

$$3 = x$$

On a map, every 1.5 in corresponds to 4 mi.  
If two towns are 6 in apart on the map,  
what is there actual distance apart?

$$\frac{1.5 \text{ in}}{4 \text{ mi}} = \frac{6 \text{ in}}{x \text{ mi}}$$

$$1.5x = 24$$

$$x = 16$$

HW

p361-362

#s13-26all, 30-33all, 37-47odd